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E I DU PONT DE NEMOURS AND COMPANY
LEGAL PATENT RECORDS CENTER
BARLEY MILL PLAZA 25/1128
4417 LANCASTER PIKE
WILMINGTON, DE 19805

EXAMINER	
SHOSHO, CALLIE E	
ART UNIT	PAPER NUMBER
1714	

DATE MAILED: 11/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/775,848	YANG, HAIXIN	
	Examiner	Art Unit	
	Callie E. Shosho	1714	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 September 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6 and 8-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6 and 8-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. All outstanding rejections except for those described below are overcome by applicant's amendment filed 9/6/06. It is noted that the double patenting rejection of record is overcome in light of applicant's filing of proper terminal disclaimer.

The new grounds of rejection set forth below are necessitated by applicant's amendment and thus, the following action is final.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-6 and 8-16 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 1 has been amended to recite that the conductive material has "particle size of greater than 0.1 to 1.2 microns". It is the examiner's position that this phrase fails to satisfy the written description requirement under the cited statute since there does not appear to be a written description requirement of the cited phrase in the application as originally filed, *In re Wright*, 866 F.2d 422, 9 USPQ2d 1649 (Fed. Cir. 1989) and MPEP 2163.

As support for the above amendment, applicant point to page 5 of the present specification. However, while this portion of the specification as originally filed provides support to recite that the conductive material has average particle size (D_{50}) of 0.1 to 1.2 microns, there is no support to recite that the conductive material has particle size "greater than" 0.1 to 1.2 microns. That is, while this portion of the specification provides support to recite values of average particle size, there is no support for the broad recitation of particle size (not average). Further, while there is support in the specification as originally filed to recite that the lower limit of the average particle size is 0.1 micron, there is no support to recite that the average particle size is "greater than" 0.1 micron as presently claimed.

It is noted, based on the disclosure on page 5 of the present specification, that when considering prior art, the examiner has considered the recitation of "particle size" in the present claims to mean "average particle size".

Claim Rejections - 35 USC § 102

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 1-2, 4-6, 8, 11-13, and 15-17 are rejected under 35 U.S.C. 102(b) as being anticipated by DE 19846096.

The rejection is adequately set forth in paragraph 7 of the office action mailed 4/6/06 and is incorporated here by reference.

It is further noted that the conductive material is in the form of agglomerates and possesses average particle size of less than 500 nm (col.3, lines 13-14 and 21-25).

6. Claims 1-6, 8-9, and 11-17 are rejected under 35 U.S.C. 102(e) as being anticipated by Kodas et al. (U.S. 2003/0175411).

The rejection is adequately set forth in paragraph 8 of the office action mailed 4/6/06 and is incorporated here by reference.

It is further noted that the conductive material possesses average particle size of at least about 0.1 μm, preferably 0.3-3 μm (paragraph 141) and that the ink possesses curable monomer (paragraph 301).

Claim Rejections - 35 USC § 103

7. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

8. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over DE 19846096 in view of either Grant et al. (U.S. 6,555,205) or Kodas et al. (U.S. 2003/0175411).

The rejection is adequately set forth in paragraph 14 of the office action mailed 4/6/06 and is incorporated here by reference.

9. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kodas et al. (U.S. 2003/0175411) in view of Adkins et al. (U.S. 6,379,444).

The disclosure with respect to Kodas et al. in paragraph 6 above is incorporated here by reference.

The difference between Kodas et al. and the present claimed invention is the requirement in the claim of specific type of monomer.

Adkins et al., which is drawn to ink jet ink, disclose the use of monomer such as trimethylolpropane tri(meth)acrylate in order to enhance curability of the ink (col.10, lines 29-64).

In light of the motivation for using specific monomer disclosed by Adkins et al. as described above, it therefore would have been obvious to one of ordinary skill in the art to use of such monomer in the ink of Kodas et al. in order to enhance curability, and thereby arrive at the claimed invention.

10. Claims 1, 4-6, 11-13, and 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirai (U.S. 2003/0146019).

Hirai disclose method of printing ink jet ink onto substrate comprising depositing the ink onto the substrate by ink jet printing wherein the ink comprises 1-50% conductive functional material such as gold, silver, copper, cobalt, etc., solvent such as alcohol, and polyvinyl pyrrolidone dispersed in the solvent. The conductive material possesses average particle size of 1-100 nm. The polyvinyl pyrrolidone is present in amount of 0.1-2 times the amount of functional material. It is disclosed that the ink possesses viscosity of 1-20 cP. The substrate

includes glass or plastic substrate (paragraphs 15-16, 26-27, 31, 35, 47-49, 53, 75-76, and 84). Attention is drawn to example 6 that discloses ink jet ink comprising 12% copper particles, polyvinyl pyrrolidone, and methanol solvent wherein the ink has viscosity of 10.5 cP. It is disclosed that the weight ratio of polyvinyl pyrrolidone to copper is 0.35 and thus, it is calculated that the amount of polyvinyl pyrrolidone present is approximately 4.2%. Although there is no explicit disclosure of the amount of solvent utilized, given that the polyvinyl pyrrolidone is present in amount of 4.2% and the copper present in amount of 12%, it is calculated that the solvent is present in amount of approximately 84%.

The only deficiency of Hirai is that Hirai discloses the use of conductive material possessing average particle size of 100 nm while the present claims require conductive material possessing average particle size of "greater than" 100 nm.

It is apparent, however, that the instantly claimed particle size and that taught by Hirai et al. are so close to each other that the fact pattern is similar to the one in *In re Woodruff*, 919 F.2d 1575, USPQ2d 1934 (Fed. Cir. 1990) or *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed.Cir. 1985) where despite a "slight" difference in the ranges the court held that such a difference did not "render the claims patentable" or, alternatively, that "a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough so that one skilled in the art would have expected them to have the same properties".

In light of the case law cited above and given that there is only a "slight" difference between the particle size disclosed by Hirai and the particle size disclosed in the present claims, it therefore would have been obvious to one of ordinary skill in the art that the particle size

disclosed in the present claims is but an obvious variant of the particle size disclosed in Hirai et al. and also that the ink of Hirai would also intrinsically possess same stability and jettability as presently claimed, and thereby one of ordinary skill in the art would have arrived at the claimed invention.

11. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hirai as applied to claims 1, 4-6, 11-13, and 15-16 above, and further in view of EP 1223201.

The difference between Hirai and the present claimed invention is the requirement in the claim of firing the ink and substrate.

EP 1223201, which is drawn to ink jet ink, disclose firing the ink and substrate after printing in order to fuse the ink to the substrate (paragraph 51).

In light of the motivation for firing the ink and substrate disclosed by EP 122301 as described above, it therefore would have been obvious to one of ordinary skill in the art to fire the ink and substrate in the process of Hirai in order to adhere the ink firmly to substrate, and thereby arrive at the claimed invention.

12. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hirai as applied to claims 1, 4-6, 11-13, and 15-16 above, and further in view of Grant et al. (U.S. 6,555,205) or Kodas et al. (U.S. 2003/0175411).

The difference between Hirai and the present claimed invention is the requirement in the claim of treating the substrate in order to change its surface tension.

Grant et al., which is drawn to ink jet method, disclose pretreating substrate with surfactant in order to lower surface tension and thus reduce spreading of composition on substrate and enhance adhesion of coating to substrate (col.3, lines 50-58).

Alternatively, Kodas et al., which is drawn to ink jet method, disclose surface modification of substrate to increase adhesion and/or control spreading of composition printed thereon through modification of surface tension (paragraph 365).

In light of the motivation for treating substrate to modify surface tension disclosed by Grant et al. or Kodas et al. as described above, it therefore would have been obvious to one of ordinary skill in the art to treat the substrate of Hirai in order to change the surface tension of the substrate and thus, increase adhesion of the ink to the substrate and control spreading of the ink on the substrate, and thereby arrive at the claimed invention.

13. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hirai as applied to claims 1, 4-6, 11-13, and 15-16 above, and further in view of Zhu et al. (U.S. 6,251,175).

The difference between Hirai and the present claimed invention is the requirement in the claim of poly(meth)acrylate.

Hirai disclose that the ink comprises binder (paragraph 31).

Zhu et al., which is drawn to ink jet inks, disclose the use of binder that is acrylic resin in order to produce ink with rapid dry time (col.4, lines 9-13 and col.5, lines 29-31 and 53).

In light of the motivation for using acrylic resin disclosed by Zhu et al. as described above, it therefore would have been obvious to one of ordinary skill in the art to use acrylic resin

in the ink of Hirai et al. in order to produce ink with rapid dry time, and thereby arrive at the claimed invention.

14. Claims 1-2, 4-6, 8, 11-13, and 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over DE 19846096.

DE 19846096, an English translation of which was provided by applicants, discloses method of printing ink jet ink onto substrate comprising depositing the ink onto the substrate by ink jet printing followed by firing the ink and the substrate wherein the ink comprises 10-99% solvent comprising water and/or organic solvent such as alcohol, ethylene glycol, etc., 0.05-80%, preferably 0.5-20%, conductive functional material that is metal oxide, and 0.1-20%, based on the amount of metal oxide, of at least one dispersant such as polyvinyl pyrrolidone and acrylic resin that is dispersed in the solvent. It is further noted that the conductive material is in the form of agglomerates and possesses average particle size of less than 500 nm. It is disclosed that the ink possesses viscosity less than 20 mPas. The substrate includes glass or plastic substrate (page 2, lines 1-2, page 2, line 15-page 3, lines 14, page 3, line 21-page 4, line 1, page 5, line 7, page 6, lines 1-6, page 7, line 16-page 9, line 15, page 10, lines 5 and 13-26, page 12, lines 18-20 and example 6).

The only deficiency of DE 19846096 is that DE 19846096 discloses the use of conductive material possessing average particle size of 100 nm while the present claims require conductive material possessing average particle size of "greater than" 100 nm.

It is apparent, however, that the instantly claimed particle size and that taught by Hirai et al. are so close to each other that the fact pattern is similar to the one in *In re Woodruff*, 919 F.2d

1575, USPQ2d 1934 (Fed. Cir. 1990) or *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed.Cir. 1985) where despite a "slight" difference in the ranges the court held that such a difference did not "render the claims patentable" or, alternatively, that "a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough so that one skilled in the art would have expected them to have the same properties".

In light of the case law cited above and given that there is only a "slight" difference between the particle size disclosed by DE 19846096 and the particle size disclosed in the present claims, it therefore would have been obvious to one of ordinary skill in the art that the particle size disclosed in the present claims is but an obvious variant of the particle size disclosed in DE 19846096 and also that the ink of DE 19846096 would also intrinsically possess same stability and jettability as presently claimed, and thereby one of ordinary skill in the art would have arrived at the claimed invention.

Response to Arguments

15. Applicant's arguments regarding Tucker et al. (U.S. 2003/019943), Noguchi et al. (U.S. 5,798,397), and Loria et al. (U.S. 5,443,628) have been fully considered but they are moot in view of the discontinuation of the use of these references against the present claims.

16. Applicant's arguments filed 9/6/06 have been fully considered but, with the exception of arguments relating to Tucker et al., Noguchi et al., and Loria et al., they are not persuasive.

Specifically, applicant argues that Hirai is not a relevant reference against the present claims given that there is no disclosure in Hirai of conductive material that possesses particle size greater than 0.1 to 1.2 microns as required in all the present claims.

However, while it is agreed that Hirai is no longer applicable against the present claims under 35 USC 102, attention is drawn to paragraph 19 of Hirai that discloses that the conductive material possesses average particle size of 1-100 nm.

It is noted that Hirai discloses the use of conductive material possessing average particle size of 100 nm while the present claims require conductive material possessing average particle size of "greater than" 100 nm.

However, it is apparent, however, that the instantly claimed particle size and that taught by Hirai are so close to each other that the fact pattern is similar to the one in *In re Woodruff*, 919 F.2d 1575, USPQ2d 1934 (Fed. Cir. 1990) or *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed.Cir. 1985) where despite a "slight" difference in the ranges the court held that such a difference did not "render the claims patentable" or, alternatively, that "a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough so that one skilled in the art would have expected them to have the same properties".

In light of the case law cited above and given that there is only a "slight" difference between the particle size disclosed by Hirai and the particle size disclosed in the present claims, it therefore would have been obvious to one of ordinary skill in the art that the particle size disclosed in the present claims is but an obvious variant of the particle size disclosed in Hirai, and thus, the ink of Hirai would also intrinsically possess same stability and jettability as

presently claimed, and thereby one of ordinary skill in the art would have arrived at the claimed invention.

On page 5 of the amendment filed 9/6/06, applicants also state that in a dependent claim the particle size has been restricted to 0.3-0.8 microns for an average particle size. It is agreed that Hirai does not disclose conductive material with such particle size and thus, Hirai is not applied against present claims 17.

Applicant also argues that DE 19846096 is not a relevant reference against the present claims given that DE 19846096 discloses the use of nano-sized conductive material, i.e. having average particle size of up to 100 nm, which is outside the scope of the present claims that now all require that the conductive material have (average) particle size greater than 0.1 to 1.2 microns.

However, on the one hand, it is noted that page 3, lines 13-14 of DE 19846096 discloses that in one embodiment, the conductive material is in the form of agglomerates possessing average particle size of less than 500 nm which clearly overlaps the particle size presently claimed.

On the other hand, in another embodiment (col.3, lines 11-12), DE 19846096 discloses that the conductive material possesses average particle size of 1-100 nm.

It is noted that DE 19846096 discloses the use of conductive material possessing average particle size of 100 nm while the present claims require conductive material possessing average particle size of "greater than" 100 nm.

However, it is apparent, however, that the instantly claimed particle size and that taught by DE 19846096 are so close to each other that the fact pattern is similar to the one in *In re Woodruff*, 919 F.2d 1575, USPQ2d 1934 (Fed. Cir. 1990) or *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed.Cir. 1985) where despite a "slight" difference in the ranges the court held that such a difference did not "render the claims patentable" or, alternatively, that "a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough so that one skilled in the art would have expected them to have the same properties".

In light of the case law cited above and given that there is only a "slight" difference between the particle size disclosed by DE 19846096 and the particle size disclosed in the present claims, it therefore would have been obvious to one of ordinary skill in the art that the particle size disclosed in the present claims is but an obvious variant of the particle size disclosed in DE 19846096, and thus, the ink of DE 19846096 would also intrinsically possess same stability and jettability as presently claimed, and thereby one of ordinary skill in the art would have arrived at the claimed invention.

Applicant argues that Kodas et al. is not a relevant reference against the present claims given that Kodas et al. disclose the use of conductive material that is nano-sized particles mixed with precursor composition while applicant's claims are directed to jet composition with large particles and low viscosity.

However, attention is called to paragraphs 31-32 of Kodas et al. that disclose that the conductive material is in the form of microparticles possessing average particle size of at least

about 0.1 μm, preferably 0.3 – 3 μm which clearly meets the requirements in the present claims with respect to particle size. Further, attention is called to paragraph 349 of Kodas et al. that discloses that the composition has viscosity of not greater than 50 cP such as 10 to 40 cP which clearly meets the requirements in the present claims regarding the viscosity. Further, while it is agreed that the composition of Kodas et al. is a precursor composition, there is nothing in the scope of the present claims which excludes the use of such composition. The present claims are drawn to ink jet printable composition. Given that paragraphs 298 and 325-326 of Kodas et al. disclose that the composition is printed onto substrate using ink jet printer, it is clear that the precursor composition of Kodas et al. is ink jet printable as presently claimed.

Applicant also argues that the presently claimed conductive materials are not metal precursors and that Kodas et al. is not ink jetting the conductive material of the present invention but rather is ink jetting a precursor solution.

Given that Kodas et al. disclose the use of conductive material identical to that utilized in the present invention, i.e. silver, gold, copper, etc., as well as explicitly disclose the use of conductive metal oxides, it is clear that regardless of what Kodas et al. refers to such materials as, including metal precursors, they are identical to the conductive material presently claimed.

Further, while it is agreed that Kodas et al. disclose ink jetting a precursor solution (paragraph 298 and 325-326), however, this precursor solution contains conductive material as presently claimed (paragraphs 28 and 31-32). Attention is drawn to paragraph 78 that discloses that the conductive material, i.e. particulates, are deposited onto the substrate. Additionally, while the precursors are reacted using various gases to convert the precursor, this conversion

appears to happen after the metal precursor, i.e. conductive material, is jetted onto the substrate (paragraphs 347-349 and 371). Thus, it is not clear why applicant argues that Kodas et al. do not ink jet the conductive material. Clarification is requested.

Conclusion

17. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Callie E. Shosho whose telephone number is 571-272-1123. The examiner can normally be reached on Monday-Friday (6:30-4:00) Alternate Fridays Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on 571-272-1119. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Callie E. Shosho
Primary Examiner
Art Unit 1714

CS
11/17/06